

## **Exercise behaviour, enjoyment and boredom**

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8      Exercise behaviour, enjoyment and boredom: A test of the 2x2 model of perfectionism

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## Abstract

Previous research investigating the role of perfectionism in exercise has been limited by both the method of investigation (largely examining independent effects of perfectionism dimensions), and the outcome variables that have been studied (mostly maladaptive outcomes). The purpose of the current study was to investigate the role of perfectionism on exercise behaviour, boredom, and enjoyment using the recently established 2×2 model of perfectionism. This model proposes that different forms of perfectionism, such as self-oriented (SOP) and socially prescribed perfectionism (SPP), will interact to influence different outcomes. One hundred and ninety-four college students completed a multi-section inventory comprised of demographics, the Multidimensional Perfectionism Scale (MPS; Hewitt & Flett, 1991b), the Physical Activity Enjoyment Scale (PACES; Kendzierski & DeCarlo, 1991), and the Godin Leisure Time Exercise Questionnaire (GLETQ; Godin & Sheppard, 1985). Somewhat contrary to the predictions of the 2×2 model, we obtained significant interactions between SOP and SPP for boredom in exercise only. More specifically, the highest levels of boredom were associated with high levels of SOP and low levels of SPP (“pure personal standards perfectionism” in the parlance of the 2×2 model). In addition, SOP was a significant negative predictor of weekly, mild, moderate, and strenuous exercise minutes and a significant positive predictor of enjoyment. SPP positively predicted mild and moderate exercise. These findings do not offer full support for the use of the 2×2 model but we suggest that the model may be better suited for more achievement related environments.

*Keywords:* perfectionism, exercise, 2×2 model

Exercise behaviour, enjoyment and boredom: A test of the 2x2 model of perfectionism

Perfectionism is a personality trait associated with the setting of excessively high standards in conjunction with a tendency to make overly critical self-evaluations (Frost, Marten, Lahart, & Rosenblate, 1990). An abundant literature has examined the effects of perfectionism on divergent outcomes in various domains (see Bardone-Cone et al., 2007; Beheshtifar, Mazrae-Sefidi, & Nekoie Moghadam, 2011; Hill & Madigan, 2017; Nounopoulos, Ashby & Gilman, 2006). Much of this literature uses the model developed by Hewitt and Flett (1991b) as a guiding framework, as Hewitt and Flett's model distinguishes between interpersonal and intrapersonal aspects of perfectionism. Specifically, Hewitt and Flett distinguish between self-oriented perfectionism (SOP), characterized by holding high perfectionistic standards for oneself, socially-prescribed perfectionism (SPP) characterized by striving towards perfectionism mainly due to pressure exerted by others to be perfect and to reach social standards of excellence or perfection, and other-oriented perfectionism (OOP) characterized by the need for others to achieve perfection. The literature using Hewitt and Flett's work converges to support the deleterious effects of SPP (Jahromi, Naziri, & Barzegar, 2012), although the effects of SOP seem less clear, as research has demonstrated positive, negative and null effects of SOP (Gaudreau & Verner-Filion, 2012). Less work has examined the role of OOP, especially within sport and exercise but research has shown that OOP is associated with different personality disorders such as antisocial and narcissistic (Hewitt & Flett, 1991a).

Historically, SPP and SOP have been studied in isolation. However, more recently researchers have begun to explore interactions between these two components of perfectionism to better understand the effects of different within-person combinations of perfectionism. The

2×2 model of perfectionism (Gaudreau & Thomson, 2010) proposes four different within-person combinations of perfectionism; (1) non-perfectionism characterized by low levels of SPP and SOP, (2) high evaluative concerns characterized by high levels of SPP and low levels of SOP, (3) high pure personal standards characterized by high levels of SOP and low levels of SPP, and (4) mixed perfectionism characterized by high levels of both SOP and SPP. This model of perfectionism was designed to compare outcomes associated with the four within-person combinations of perfectionism. Originally, the model was developed using the broader dimensions of perfectionism; evaluative concerns perfectionism (ECP) and personal standards perfectionism (PSP), but it has (and can) be applied to the more specific dimensions of perfectionism (Gaudreau & Verner-Filion, 2012). The model testing the broader dimensions of perfectionism has mainly been used in sport and has been shown to predict outcomes such as burnout (Hill, 2013; Nordin-Bates, Raedeke, & Madigan, 2017). The model posits that SOP and SPP co-exist in all individuals to a certain degree, and understanding the nature of the within-person organization of perfectionism can more likely determine the type of perfectionism associated with more or less positive outcomes (Gaudreau & Verner-Filion, 2012; Flett & Hewitt, 2006). In sport, this model has shown pure SPP to be the most detrimental within-person combination of perfectionism when comparing athlete's perfectionist traits to well-being (affect, satisfaction with life, and vitality; Gaudreau & Verner-Filion, 2012) and burnout (Hill, 2013). In addition, pure PSP has been associated with better outcomes, such as threat appraisal and athlete goal progress, compared to all other within-person combinations, (Crocker, Gaudreau, Mosewich, & Kljalic, 2014).

In the exercise domain, perfectionism has mostly been studied in relation to less desirable outcomes such as excessive exercise and exercise dependence (see Hagan &

Hausenblas, 2003; Hill, Robinson, & Stamp, 2015). These studies have utilized a combination of variable and group based approaches. For example, in relation to exercise dependence, evidence suggests that both SOP and SPP may have a direct and positive effect on exercise dependence, or may be mediated by an additional variable such as self-acceptance or self-presentation (Hall, Hill, Appleton, & Kozub, 2009). Although not as extensive, there has also been research that posits how aspects of perfectionism may play a positive role in the exercise domain. Anshel and Seipel (2006) found that the maintenance of an exercise regimen in college students was positively and significantly related to dimensions of perfectionism such as organization. Longbottom, Grove, and Dimmick (2010) found a similar relationship between dimensions of perfectionism and aerobic exercise, mediated by both autonomy and self-presentation. Self-oriented perfectionism had a positive indirect effect on exercise behaviour via autonomy and self-presentation (although both individual paths involving self-presentation were negative), highlighting the importance of the dimensions of perfectionism that may have beneficial consequences relative to exercise behaviour.

In college students, both perfectionism and exercise have been studied separately, each with a number of different variables. Perfectionism has been link to self-efficacy, disordered eating or dietary restraint, and motivation (Locicero & Ashby, 2000; Neumeister, 2004; Paulson & Rutledge, 2014). Similarly, exercise has also been looked at in college students with motivation, diet, and a number of psychological health variables (Kilpatrick, M., Herbert, E., & Bartholomew, J. 2005; Thome & Espelage, 2004). Studied together, researchers have found that for college women, those who experience less distress when their exercise performance do not meet their standards (discrepancy) are at less risk for disordered eating (Paulson & Rutledge, 2014). For both college men and women, organization, which is positively linked to

personal standards of perfectionism is significantly linked to the maintenance of a exercise regimen (Anshel & Siepel, 2006).

Although these studies provide evidence of a relationship between dimensions of perfectionism and exercise behaviour in both athletes and college students, more work is needed. Indeed, understanding different variables that may impact exercise (positively or negatively) is important for behaviour change, intervention development, and recognizing more or less helpful patterns of behaviour (i.e., exercise addiction). Previous work has shown how both enjoyment and boredom can influence or predict exercise behaviour (Hagber, Lindahl, Nyberg, Hellenuis, 2009; Salmon, Owen, Crawford, Bauman, Sallis, 2003), where enjoyment of exercise is associated with an increase in exercise duration and boredom is associated with shorter exercise duration. With these variables having a strong relationship with exercise, they are worth exploring when examining perfectionism and its own potential influence on exercise behaviour. Given the complexity of perfectionism, and its relationship with exercise, the 2×2 model could help to further distinguish how perfectionism can influence different behaviours, yet the 2×2 model has yet to be tested in the exercise domain.

With these issues in mind, the purpose of the following study was to use the model to examine the relationship between perfectionism and exercise behaviour and exercise related cognitions (i.e., enjoyment and boredom). The model proposes four theoretically driven hypotheses (or outcomes; Gaudreau & Thompson, 2012). For pure SOP, or pure personal standards perfectionism, based on the healthy nature of SOP and the unhealthy nature of SPP, pure SOP is associated with better psychological adjustment compared to non-perfectionism. In contrast, pure SPP (i.e., high evaluative concerns) is associated with poorer adjustments when compared to non-perfectionism, and should be related to the most negative outcomes

when compared to the three other forms of perfectionism (Gaudreau & Thompson, 2012). Finally, for mixed perfectionism there are two hypotheses; (1) mixed perfectionism should be associated with better psychological adjustment and higher levels of internalization compared to SPP, and (2) mixed perfectionism should be associated with lower levels of internalization and worst psychological adjustment compared to pure SOP. With these proposed effects in mind, we hypothesized that pure SPP would be the most detrimental within-person combination of perfectionism (correlated with low enjoyment, and increased boredom); that mixed perfectionism would be associated with better outcomes compared to pure SPP, but poorer outcomes when compared with pure SOP (those with SOP would have the highest levels of enjoyment and the lowest levels of boredom). We also hypothesized that pure SPP would be correlated with decreased exercise behaviour, and pure SOP would be correlated with the highest levels of exercise behaviour.

## Method

### Participants & Procedure

Following ethics approval, we recruited participants from an undergraduate university class. Participants received a link to the online survey, and had one month to complete the assessment at one time. The online questionnaire took participants ~25 minutes to complete. All participants received a letter of invitation and gave informed consent before proceeding to data collection. One hundred and eighty-two participants (66% female) took part in the study. The age of the participants ranged from 18-25 ( $M = 20$ ,  $SD = 1.1$ ). The majority of the participants were Caucasian (77%), while the remaining participants reported being, Aboriginal (1%), Asian (12%) and other (10%). All participants were currently enrolled in an undergraduate degree program.



## 148 **Instrumentation**

149 **The Godin Leisure Time Exercise Questionnaire** (GLETQ; Godin & Sheppard, 1985).

150 The GLETQ is a self-report measure of leisure-time exercise habits based on a typical 7-day  
151 week. Participants indicated the number of times per week they engaged in strenuous (i.e.,  
152 running, hockey), moderate (i.e., fast walking, tennis), and mild exercise (i.e., yoga, bowling) at  
153 15 minute intervals. Exercise scores were calculated by multiplying the number of times  
154 participants indicated participating in an activity by 15. Weekly exercise minutes were  
155 calculated by adding the number of minutes for mild, moderate and strenuous activity. The  
156 GLETQ has shown to be valid and reliable when for classifying individuals by their exercise  
157 behaviour (i.e., active or not; see Amireault & Godin, 2015).

158 **The Multidimensional Perfectionism Scale** (MPS; Hewitt & Flett, 1989). The subscales  
159 used in the current study were self-oriented perfectionism (SOP), and socially prescribed  
160 perfectionism (SPP). Participants rated 30 items (15 per scale) on a 7-point Likert scale, from 1  
161 (*agree*) to 7 (*disagree*). Each item from each subscale were added to create a total score for  
162 each type of perfectionism. For a review of validity, reliability and psychometric properties,  
163 see Hewitt, Flett, Turnbull-Donovan, and Mikail (1991).

164 **Positive and Negative Affect Scale** (PANAS; Watson, Clark, & Tellegen, 1988).

165 Individuals were asked to indicate how they feel at the present moment. Items are measured on  
166 a 5-point Likert scale from 1 (*very slightly or not at all*) to 5 (*extremely*); sample items include  
167 “Interested”, “Upset”, and “Attentive”. Items for each subscale (positive affect and negative  
168 affect) are added to create two overall scores. There is evidence to show internal consistency  
169 of the scales, as well as convergent and divergent validity (see Watson et al., 1988). We  
170 entered scores from the PANAS as covariates in all analyses to account for mood state of

participants. Current mood state can influence the responses given on self-report scales, and thus can contribute to common method variance (Podsakoff, MacKenzie, & Lee, 2003). Therefore, controlling for mood state is recommended in correlational designs to reduce the influence of common method variance.

**Physical Activity Enjoyment Scale** (PACES; Kendzierski & DeCarlo, 1991). Participants are asked to rate how they feel about exercise; each item is measured on a dichotomous 5-point Likert scale. Examples of anchors/items include, “I enjoy it; I hate it”, and “I find it energizing; I find it tiring”. An overall enjoyment score was calculated by first reversing 11 items, and then adding up all items for the scale. Higher scores on the PACES indicate more enjoyment, where lower scores indicated more boredom. Research exists supporting both reliability and validity of the scale (see Crocker, Bouffard & Gessaroli, 2005; Kendzierski & DeCarlo, 1991).

### **Data Analysis**

We screened data for missing values and four cases were deleted due to incomplete data (i.e., missing an entire subscale). Coefficient alphas for all scales of each instrument were appropriate; all subscales were  $>.70$  (see Table 1 for reliability of each subscale).

Based on previous work and recommendations (Gaudreau, 2012) we tested the predictions of the 2×2 model using moderated hierarchical regression (Cohen, Cohen, West, & Aiken, 2003). This type of analysis takes into account the continuous nature of SOP and SPP, as opposed to using cut-off points or creating sub-groups (Bissonnette, Ickes, Berstein, & Knowles, 1990). We entered scores from the PANAS first as covariates to account for mood state of participants. Other covariates were explored (i.e., age and gender) and found to be insignificant, so were not included in the following analyses.

In the second step of the model we entered the centered variables for SOP and SPP, followed by the interaction term. Where significant interactions were evident, we used simple slopes to estimate the relationship between SOP and SPP and the outcome variables (exercise behaviour, boredom, and enjoyment).

Although the 2x2 rests on the premise of interactions, support for the model can be obtained in the absence of interactive effects (cf. Gaudreau, 2012). Thus, where we failed to find interactions we utilized Gaudreau's (2012) approach and ran multiple regression analyses using non-standardized values, and with the interaction term removed, to estimate the main effects of SPP and SOP on exercise behaviour and enjoyment. For significant interactions, a first set of simple slopes were calculated to estimate the relationship between SOP and the outcome variable at low SPP and at high SPP. The first simple slope can be used as a contrast to compare the predicted values of non-perfectionism and pure SPP. The second simple slope compares the predicted values of pure SOP and mixed perfectionism. A second set of simple slopes were calculated to estimate the relationship between SPP and the outcome variable at low SOP and at high SOP. The third simple slope contrasts the predicted values of non-perfectionism and pure SOP. The final simple slope compares the predicted values of pure SPP and mixed perfectionism. The following equations were used to obtain the predicted values:

$$(1) \hat{Y} \text{ of Non-perfectionism} = \text{Intercept} + (B_{\text{SOP}} * \text{low SOP}) + (B_{\text{SPP}} * \text{low SPP}).$$

$$(2) \hat{Y} \text{ of pure SOP} = \text{Intercept} + (B_{\text{SOP}} * \text{High SOP}) + (B_{\text{SPP}} * \text{low SPP}).$$

$$(3) \hat{Y} \text{ of pure SPP} = \text{Intercept} + (B_{\text{SOP}} * \text{Low SOP}) + (B_{\text{SPP}} * \text{High SPP}).$$

$$(4) \hat{Y} \text{ of mixed perfectionism} = \text{Intercept} + (B_{\text{SOP}} * \text{High SOP}) + (B_{\text{SPP}} * \text{High SPP}).$$

## Results

### Descriptive Analysis

The participants, on average, indicated that they exercised 1.40 days a week ( $SD = .53$ ); and engaged in mild exercise for 6.49 hours ( $SD = 11.65$ ), moderate exercise for 5.09 hours ( $SD = 8.96$ ), and vigorous exercise for 3.95 hours ( $SD = 3.57$ ). Participants indicated taking part in a number of different exercise activities, at various levels, including but not limited to, running, walking, yoga, intramural sports, dance, soccer, rugby, and group fitness classes.

## Main Analysis

Moderated hierarchical regressions indicated that the interaction between SOP and SPP was non-significant for both exercise behaviour (weekly, mild, moderate, and strenuous activity) and enjoyment (see Table 2 and Table 3, respectively). Although it was hypothesized that pure SPP would be the most detrimental within-person combination of perfectionism (correlated with low enjoyment or boredom and therefore, decreased exercise behaviour), our results did not align with this hypothesis. Table 1 includes means, standards deviations, and correlations between each variable analyzed.

**Exercise enjoyment. Boredom.** The interaction was statistically significant when predicting boredom ( $B = -.0005$ ,  $\beta = .0002$ ,  $t = -2.74$ ,  $p = .01$ ; see Table 2). This interaction effect explained 3.5% of variance in boredom in exercise over and above the effects of SOP and SPP. The simple slope of SOP on boredom approached significance at low levels of SPP ( $B = -9.26$ ,  $\beta = .0048$ ,  $t = 1.91$ ,  $p = .057$ ) but was not significant at high levels of SPP were not significant ( $B = 8.55$ ,  $\beta = -.004$ ,  $t = -1.41$ ,  $p = .16$ ). The simple slope of SPP on boredom was significant at high levels of SOP ( $B = 9.29$ ,  $\beta = -.012$ ,  $t = -4.46$ ,  $p = .000$ ), but not at low levels of SOP ( $B = -10.23$ ,  $\beta = -.002$ ,  $t = -.69$ ,  $p = .49$ ). Figure 1 displays the nature of the interaction for SOP and SPP, and indicates that participants were the most bored when SOP was high and SPP was low, and that they had decreased boredom when both SPP and SOP were high. This

significant interaction supports the underlying premise of the 2×2 model, but contradicts the four main hypotheses. This interaction indicated that pure SOP was associated with the highest levels of boredom compared to non-perfectionism and mixed perfectionism was associated with decreased boredom compared to SPP. Further SOP was associated with the highest levels of boredom compared to a within-person combination of mixed perfectionism; and pure SPP was associated with the lowest rates of boredom compared to non-perfectionism. Therefore, SOP (not SPP) was associated with the most detrimental outcome for exercise cognition (increased boredom).

**Enjoyment.** Multiple regression revealed that SOP was a significant positive predictor of enjoyment ( $B = .007$ ,  $\beta = .003$ ,  $t = 2.49$ ,  $p < .05$ ; see Table 2). As one increased in beliefs that attaining perfectionism is important; their enjoyment of exercise also increased. SPP was not a significant predictor of enjoyment ( $B = -.0004$ ,  $\beta = 0$ ,  $t = 0.12$ ,  $p = 0.91$ ). The predicted values for enjoyment based on the 2 × 2 framework are shown in Figure 2. This result aligns with our hypothesis that pure SOP would have the highest levels of enjoyment, and would be associated with better psychological adjustments, whereas, pure SPP is associated with poorer adjustments. Also, consistent with the model, mixed perfectionism was associated with higher levels of enjoyment than pure SPP and lower levels of enjoyment of pure SOP.

**Exercise behaviour. Weekly exercise minutes.** SOP was a significant negative predictor of weekly exercise minutes ( $B = -8.30$ ,  $\beta = 3.35$ ,  $t = -2.47$ ,  $p < .05$ ; see Table 3). SPP approached significance in relation to being a positive predictor of weekly exercise minutes ( $B = 6.36$ ,  $\beta = 3.59$ ,  $t = 1.77$ ,  $p = .07$ ). Therefore, as individuals became more concerned with perfection to maintain their value to others, their weekly exercise minutes' increased, while those who had increased self-directed tendencies to obtain perfection because

it is important to them, had decreased weekly exercise minutes. This finding contradicts the hypothesis that pure SOP is associated with better psychological adjustment, and pure SPP is associated with poorer adjustments. For mixed perfectionism, the predicted values did not support the model hypotheses by showing that mixed perfectionism had both lower levels of weekly exercise minutes than pure SPP and higher weekly exercise minutes than pure SOP). The predicted values of weekly exercise minutes based on the 2×2 framework are shown in Figure 3.

**Mild exercise minutes.** Both SOP and SPP were significant negative and positive predictors, respectively, of mild exercise minutes ( $B = -4.25$ ,  $\beta = -1.68$ ,  $t = -2.53$ ,  $p < .05$ ;  $B = 3.50$ ,  $\beta = .180$ ,  $t = 1.94$ ,  $p < .05$ ; see Table 3). As with weekly exercise minutes, those who were more concerned with perfection to maintain their value to others, report greater levels of mild exercise, while those who have increased self-directed tendencies to obtain perfection because it is important to them, have decreased mild exercise minutes. This finding again contradicts the idea of the better psychological adjustments of pure SOP and the poorer psychological adjustment of SPP, but does support the difference in these two combinations of perfectionism. For mixed perfectionism, the model was contradicted with lower mild exercise minutes for mixed perfectionism compared to pure SPP and higher levels of mild exercise minutes compared to pure SOP. The predicted values of mild exercise minutes across the within-person combinations of perfectionism based on the 2x2 framework are shown in Figure 4.

**Moderate exercise minutes.** Both SOP and SPP were significant negative and positive predictors, respectively, of moderate exercise minutes ( $B = -2.79$ ,  $\beta = 1.30$ ,  $t = -2.15$ ,  $p < .05$ ;  $B = 2.32$ ,  $\beta = 1.39$ ,  $t = 1.67$ ,  $p < .05$ ; see Table 3). Similar to weekly and mild exercise

minutes, the same pattern occurred, where as one became more concerned with perfection to maintain his/her value to others, weekly exercise minutes' increased, while those who have increased self-directed tendencies to obtain perfection because it is important to them, had a decrease in weekly exercise minutes. These findings contradict the hypotheses of the healthy nature of SOP and the unhealthy nature of SPP, but are showing significant differences between the two that support the hypothesis proposed by Gaudreau and Thompson (2012) that pure SPP and pure SOP do significantly differ in terms of psychological adjustment. As with mild exercise, the model is not supported by the predicted values of mixed perfectionism; with lower levels of moderate exercise minutes for mixed perfectionism than pure SPP and higher levels of moderate exercise minutes with pure SOP. The predicted values of moderate exercise minutes across the within-person combinations of perfectionism are shown in Figure 5.

***Strenuous exercise minutes.*** For strenuous exercise, SPP had no effect, while SOP had a negative effect similar to mild and moderate exercise ( $B = -1.25$ ,  $\beta = .513$ ,  $t = -2.46$ ,  $p = .02$ ; see Table 3). The predicted values of strenuous exercise minutes across the within-person combinations of perfectionism are shown in Figure 6. Those who had increased self-directed tendencies to obtain perfection because it was important to them, had their exercise minutes (weekly, mild, moderate, and strenuous) decrease. As with mild, moderate, and weekly exercise, strenuous exercise did not support the healthier nature or better psychological adjustments of pure SOP. Strenuous exercise did not show support of the model's hypotheses, that pure SOP and SPP were significantly different in terms of psychological adjustments, as the non-effect of pure SPP, was more similar to the positive effect seen in other variables. For mixed perfectionism, the predicted values did not support the hypotheses of the model,

showing higher levels of strenuous activity for mixed perfectionism than pure SOP and lower levels of strenuous exercise for mixed perfectionism than pure SPP.

### Discussion

The purpose of this study was to use the 2×2 model of perfectionism to examine the relationship between perfectionism, exercise behaviour, and enjoyment of exercise. The 2×2 model identifies four within-person combinations of dispositional perfectionism, and using this theoretical model allows researchers to identify unique interactive effects of SOP and SPP. Our findings provide support for our hypothesis of the unhealthy nature of SPP, the healthy nature of SOP and that mixed perfectionism would have a more positive nature than SPP but less than SOP for only the variable of Enjoyment. Boredom and all three aspects of exercise behaviour (mild, moderate, and strenuous minutes) did not provide support for our hypotheses made based on the 2×2 model.

We hypothesized that pure SPP would be the most detrimental within-person combination of perfectionism, and that pure SOP and mixed perfectionism would be positively associated with exercise behaviour. Contradictory to these hypotheses, our results indicated that those with higher SOP had lower exercise behaviour with respect to mild, moderate, strenuous, and weekly exercise minutes. Those higher in SPP were also higher in weekly, mild, and moderate minutes, but not strenuous minutes of exercise. This finding suggests that those who are striving for perfection because it is important to them rather than achieving perfection for the views of others, exercise less. In addition, individuals higher in SPP also found exercise more enjoyable and were less bored than their SOP counterparts. Therefore, it is possible that in the exercise domain, when a person is striving for perfection because it is



important to them, they tend to enjoy it less and consequently exercise less (decrease the number of exercise minutes).

Despite not supporting our hypotheses our results are interesting and warrant further investigation. An increase in SOP and a lack of SPP revealed an increase in participant boredom. Individuals who have higher standards and may not be able to achieve them may become less interested, and therefore more bored with their current exercise regimen. They may well prefer a more achievement-oriented environment than that provided by exercise or benefit from particular types of exercise where achievement is more readily measurable. Understanding individual levels of perfectionism and the behaviours or tendencies that are associated with the levels of this trait are important. For example, these tendencies could be potentially important for health reasons, as those who are bored may be less motivated and more likely to quit or not follow through with an exercise or exercise program. In addition, our results do highlight that increased SPP predicts an increase in exercise behaviour. In other words, an increase in evaluative concerns, may lead to increases in exercise behaviour (number of exercise minutes per week), which supports previous work (Hall, Kerr, Kozub, & Finnie, 2007), but more work is need with longitudinal designs to make more conclusive statements.

As Pure SPP emerged as the strongest predictor of exercise behaviour, this may have implications for exercise dependence. Previous research has shown that perfectionism may be an important precursor of dependence (Hagan & Hausenblas, 2003). Costa and colleagues recently found that ‘maladaptive’ perfectionism or perfectionistic concerns were indirectly related to exercise dependence through needs thwarting and needs satisfaction (Costa, Coppolino & Oliva, 2016). Future research should consider looking at exercise dependence in

conjunction with the within person combinations of perfectionism and exercise behaviour to help further our understanding of the impact of perfectionism in exercise.

Previous research in areas such as academia and sport, although limited, has found consistent results using the 2×2 model for studying perfectionism (Gaudreau, 2016). In contrast, our results did not fully support the hypotheses of the 2×2 model. This finding may be due in part to the setting of exercise, as the model has been used mostly in achievement settings (i.e., the classroom and sport). In school and sport there may be more pressure or expectation to perform and therefore the relationship with perfectionism and performance may be more relevant or distinct. The model may be better suited for areas in exercise such as dependency that has shown to be highly correlated with perfectionism (Hagan & Hausenblas, 2003), or goal achievement in exercise. For these types of variables that are associated with perfectionism; the model may be able to show, more specifically, which type of perfectionism can predict these different behaviours. Future research should consider these aspects of exercise behaviour in relation to the 2×2 model to more fully understand if, and how, the different types of perfectionism within the model explain exercise related behaviours and cognitions.

Although this study was one of the first to use the 2×2 model in conjunction with exercise behaviour, used both adaptive and maladaptive measures, and accounted for mood state, there are still some limitations that need to be recognized. First, our sample was mostly second year university students enrolled in a kinesiology degree program. A larger, more diverse sample would allow for a deeper understanding on the impact of perfectionism on exercise behaviour and enjoyment. Second, our study is limited by the use of subjective measures only. Objective measures of exercise would strengthen the results and conclusions of

375 the study. Future researchers are encouraged to use objective methods (i.e., ActivePAL  
376 devices) to document exercise behaviours more precisely, as well as using longitudinal designs  
377 that are able to look at behaviour across time.

378 Overall, our study is one of the first to use the 2×2 model of perfectionism in an exercise  
379 setting. Although our results do not support the model completely, we are unable to draw firm  
380 conclusions and, therefore further research of the model is warranted in exercise settings. This  
381 will help determine whether the model is best suited for use in achievement settings, as it has  
382 been used for in the past, or whether the model may not be suited for use in the exercise  
383 domain. Future research should continue to use the 2×2 model of perfectionism in different  
384 areas of exercise, as well as in a larger, more diverse sample, over a longer period of time that  
385 could offer more insight into the role of mixed perfectionism and non-perfectionism in exercise  
386 behaviour.

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